Transmutation of radioactive nuclear waste - present status and requirement for the problem oriented nuclear data base. Approach to scheduling the experiments (reactor, target, blanket).

V. Artisyuk[1], A. Ignatyuk[2], A. Lopatkin[3], Yu. Korovin[1], A. Stankovsky[1], Yu. Titarenko[4]

[1] *Obninsk State Technical University for Nuclear Power Engineering (INPE)*
[2] *Institute of Physics and Power Engineering (IPPE)*
[3] *Research and Development Institute of Power Engineering (NIKIET)*
[4] *Institute for Theoretical and Experimental Physics (ITEP)*

Starting from the middle of the 80-s there have been a lot of activity worldwide, USSR/Russia included, in developing of Nuclear fuel cycle and its proper components acceptable for transmutation of long-lived nuclear wastes. Different options are considered: fission reactors with thermal and fast spectrum, including special reactor-transmuters, blanket of fast reactors. Each of these options has both attractive features and complex problems.

New NFC is developing in Russia with features of minimized dangerous of the wastes directed for final burial. The NFC is based on fast power reactors with transmutation of the main part of its own RAW. Subcritical blankets may be used at the end stage of the nuclear energy.

Blankets of accelerator driven transmuters as well as fusion machine received significant national and international attention. Being subcritical, these facilities need in intensive neutron source: target of high energy proton accelerator or thermo-nuclear plasma The main feature attributed to accelerator-driven transmuters is an essential broadening in the nucleon energy of primary neutrons (up to 1 GeV) compared to traditional fission reactor. Concerning their fuel composition, it is worth to emphasize that subcritical mode of operation gives an opportunity to burn out large amounts of minor actinides.

Due to the facts that irradiated compositions (minor actinides and some extracted fission products) are not traditional fuel material, and irradiate conditions, are unusual, particularly in accelerator target and blanket.

Transmutation as a goal of irradiation arise specific to accuracy of nuclear data for isotopes — candidates for transmutation, which essentially differ from requirements, used for traditional fuel cycle.

As the matter of the fact that there is lack of reliable nuclear data for both minor actinides, fission products and structural materials in the energy region both over traditional reactor energies (0 – 10 MeV), for area of essentially higher energy (up to 1 GeV and even higher).

In addition to that, designing the spallation target brings about essentially new engineering problems associated with accumulation in situ various spallation products which have not been of concern in traditional nuclear power technology.

It seems reasonable that general urge towards principal improvement of NFC through transmutation technologies provoked among others numerous attempts to measure and evaluate nuclear data with proper quality. Therefore the ISTC sponsored impressive list of the projects focused on measurement of nuclear data for transmutation or/and processing available data into cross-section files and libraries.

Email: korovin@iate.obninsk.ru